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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/918,136	07/30/2001	Jianming Fu	AM2390.D2	3336

7590 03/05/2002

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EXAMINER
CANTELMO, GREGG

ART UNIT	PAPER NUMBER
1753	5

DATE MAILED: 03/05/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/918,136	FU, JIANMING	
	Examiner	Art Unit	
	Gregg Cantelmo	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 January 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *6-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *6-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 July 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☒ Interview Summary (PTO-413) Paper No(s). 3 .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Priority

1. This application appears to be A divisional of US application No. 09/546,798 filed April 11, 2000, which is a CIP of US application No. 09/373,097 filed August 12, 1999 (now US patent No. 6,183,614) which is a CIP of US application No. 09/249,468 (now US patent No. 6,290,825).

Information Disclosure Statement

2. The information disclosure statement filed August 29, 2001 has been placed in the application file and the information referred to therein has been considered as to the merits.

Drawings

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

a. Reference characters 192 and 198 are not in Fig. 17 as recited on page 18, line 22 of the specification. It may be better served that these reference characters be amended to components 202 and 208, respectively (as found in Fig. 17).

b. target 216 is not found in either Figs. 18 or 19 (see page 21, lines 11 and 14) . It may be better served that the target in these figures is component 14.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: characters 234 and 232 do not appear to be in the description. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

5. The disclosure is objected to because of the following informalities: the status of US application Nos. 09/249,468 and 09/546,798 should be updated to the appropriate patent number.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 6-10 and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claim 6 recites the limitation "said chamber" in line 9. There is insufficient antecedent basis for this limitation in the claim.

9. The term "rapid" in claim 12 is a relative term which renders the claim indefinite. The term "rapid" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The specification fails to provide any rates which would define the term rapid. See the Example starting at the bottom of page 32 of the specification. Therein the specification teaches of RTA but no rates of the anneal process which would define what Applicant appreciated as being "rapid."

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 11, 12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. patent No. 5,833,817 (Tsai) in view of Musil et al., "Unbalanced Magnetrons

and new sputtering systems with enhanced plasma ionization" (hereafter referred to as Musil) and U.S. patent No. 5,556,519 (Teer).

Tsai discloses a tungsten fill process comprising: placing a substrate 10 containing a hole formed in BPSG in a sputtering reactor including a titanium target, sputtering titanium 16 and titanium nitride 16 into the hole and thereafter filling tungsten 30 into the hole (see Fig. 3b). The Ti-TiN layer is formed by PVD techniques including magnetron sputtering (col. 3, ll. 20-25 and prior art claim 2 as applied to claim 11). The tungsten is formed by CVD (col. 1, ll. 28-37 as applied to claim 14). Tsai employs an RTA process after sputtering the barrier layer (col. 4, ll. 24-29 as applied to claim 12).

The differences between the instant claims and Tsai are that Tsai does not disclose the particulars of the magnetron arrangement or of using an unbalanced magnetron (claim 11).

Tsai appreciated the use of magnetron sputtering in depositing the barrier layers onto the substrate. Magnetron sputtering techniques result in a strong decrease in the plasma impedance and decrease of the discharge voltage and also a strong increase in the deposition rate of films on a substrate Also due to enhanced plasma confinement, magnetron sputtering can be carried out at lower pressures (see Musil page 117). Musil further discloses that unbalanced magnetrons provide improved plasma confinement (see Fig. 1c) which would have transported high ion currents to the substrates. In the unbalanced arrangement in Fig. 1c, there are two sets of magnets and outer magnet and inner magnet. The term "unbalanced magnetron sputtering" (UMS) refers in the art to magnetron sputtering wherein the flux densities in north and south poles of a

magnetron are unequal, in other words a difference between the magnetic flux of each pole exists. Selection of a differential between the individual magnetic fluxes provides the unbalanced effect shown in this figure. In employing unbalanced magnetron techniques as taught by Musil, the skilled artisan would have employed two magnetic poles as shown by Musil Fig. 1c and created a flux differential between these two magnet poles to confine the plasma to the substrate.

The motivation for using unbalanced magnetron arrays are that such configuration would have resulted in a strong decrease in the plasma impedance and decrease of the discharge voltage and also resulted in a strong increase in the deposition rate of films on a substrate. Also due to enhanced plasma confinement, magnetron sputtering could have been carried out at lower pressures. Unbalanced magnetrons would have provided improved plasma confinement, which would have transported high ion currents to the substrates.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Tsai by using unbalanced magnetron sputtering as taught in Musil since it would have resulted in a strong decrease in the plasma impedance and decrease of the discharge voltage and also resulted in a strong increase in the deposition rate of films on a substrate. Also due to enhanced plasma confinement, magnetron sputtering could have been carried out at lower pressures. Unbalanced magnetrons would have provided improved plasma confinement, which would have transported high ion currents to the substrates.

With respect to the particular differential between the poles being at least 1.5:

The unbalanced magnetron which has inner and outer magnets and in which the field strength of the outer magnets is much higher than the field strength of the inner magnets. The `extra` field lines leaving the outer magnets trap electrons escaping from the magnetron discharge and prevent them from drifting to the various earthed parts of the chamber. These electrons cause ionization in the vicinity of the electrically biased substrate and the ions so formed are attracted to the substrate by the substrate bias, and the substrates receive a higher ion current than in a situation where the magnetrons are balanced (Teer col. 2, ll. 1-11).

Thus while the prior art does not explicitly recite that the strength differential of the total magnetic flux is at least 1.5 times greater for the outer pole than inner pole, the skilled artisan would have known that in order to provide an unbalanced magnetron effect, the outer magnet need have a much higher field strength than the inner magnets.

It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Tsai in view of Musil by selecting a high flux differential between the inner and outer poles as taught by Teer since it would have provided an unbalanced magnetron effect which focused the plasma to the substrate and provided a higher ion current to the substrate. Selection of optimum or workable ranges involves only routine skill in the art. *In re Boesch,* 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

12. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai in view of Musil and Teer as applied to claims 11, 12 and 14 above, and further in view of U.S. patent No. 5,599,739 (Merchant).

The difference not yet discussed is not annealing between the sputtering and filling steps.

Tsai discloses using an RTA step to react the titanium layer with the silicon to form TiSi2 while also forming intimate chemical bonds with the BPSG. While this step is employed, Tsai does not state that this steps is critical to forming the multilayer structure.

The specification does not provide any unexpected results or novel benefits to the process which does not anneal the barrier layer.

While not wishing to be bound to any theory, it is believed that RTA tends to cure pinhole defects in the titanium nitride layer, thereby reducing the likelihood of volcano growth during tungsten deposition. It should be understood that annealing is an optional step (col. 3, ll. 38-53).

Thus while RTA of barrier layers tends to cure pinhole defects in the barrier layer, such a process can be an optional process and thus not required.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Tsai by not employing an annealing step since the RTA annealing step is known in the art as an optional step for curing pinhole defects.

13. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai in view of Musil and Teer as applied to claims 11, 12 and 14 above, and further in view of U.S. patent No. 4,717,462 (Homma).

The difference not yet discussed is of sputter depositing the tungsten (claim 15).

As is well known, in the production of semiconductor integrated circuits, bubble memory elements and the like, a deposition method, such as vacuum evaporation, sputtering or CVD (Chemical Vapor Deposition), is employed in order to form various types of thin films. Of these methods, sputtering has an advantage in that it has the capability of forming a high -melting-point metal film and a thin film with a composition similar to that of a target and with a sufficient uniformity. Therefore, sputtering deposition is widely used for the formation of various kinds of metal or alloy films such as W, Mo or Al-Si alloy, or of an insulating film such as SiO_2, Al_2O_3 or Ta_2O_5. Furthermore, since sputtering is advantageous in that the impurity content of the deposited film is extremely small, this method has replaced conventional vacuum evaporation for the purpose of forming a film of a metal having a relatively low melting point, such as Al (Homma, col. 1, ll. 9-27).

The motivation for sputtering tungsten is to deposit a tungsten film of higher purity and of the same composition as the target.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Tsai by sputtering the tungsten plug since it would have deposited a tungsten film of higher purity and of the same composition as the target.

14. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai in view of Musil and Teer as applied to claims 11, 12 and 14 above, and further in view of U.S. patent No. 5,593,551 (Lai).

The difference not yet discussed is of rotating the magnetron about the back of the target.

Musil shows in Fig. 1c of a magnetron array disposed behind and about the back of the target. Musil does not show the magnetron array to be a rotating array.

The skilled artisan would have found such a modification to be well known and obvious.

In Lai, magnet means 80 may be configured to provide highly uniform erosion over nearly the entire surface 75 of sputter target assembly 70 when it is rotated.

The motivation for rotating the magnetron array is to provide uniform erosion of the target surface and thus improve the utility factor and extend the life of the target.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Tsai by rotating the magnetron array since it would have provided uniform erosion of the target surface and thus improved the utility factor and extended the life of the target.

Double Patenting

15. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefore ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re*

Ockert, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

16. Claim 10 is rejected under 35 U.S.C. 101 as claiming the same invention as that of claim 7 of prior U.S. Patent No. 6,290,825 (Fu-825). This is a double patenting rejection.

Instant claim 10 recites a method of sputtering a material from a target comprising a metal onto a working substrate supported on a pedestal in a system including a magnetron disposed on a side of said target opposite said pedestal and including an outer pole of one magnetic polarity and surrounding an inner pole of another magnetic polarity, wherein said outer pole extends from said center of said target to a peripheral portion of said target and has an area smaller than a similarly extending circle, said method comprising:

Rotating said magnetron about a center of said target to achieve full sputtering coverage of said target; and

Capacitively coupling power into said chamber at least partially by applying DC power to said target but not including inductively coupling power into said chamber to thereby excite said working gas into a plasma to sputter said metal from said target onto said working substrate, an amount of said DC power being no more than 18 kW normalized to a circular reference substrate of 200mm diameter, thereby achieving an ionization density of said metal of at least 20% wherein an integrated magnetic flux

produced by said outer pole is at least 1.5 times an integrated magnetic flux produced by said inner pole (claim 10).

Fu-825 recites in claim 7:

Instant claim 10 recites a method of sputtering a material from a target comprising a metal onto a substantially circular working substrate supported on a pedestal in a system including a magnetron disposed on a side of said target opposite said pedestal and including an outer pole of one magnetic polarity and surrounding an inner pole of another magnetic polarity, wherein said outer pole extends from said center of said target to a peripheral portion of said target and has an area smaller than a similarly extending circle, said method comprising:

Rotating said magnetron about a center of said target to achieve full sputtering coverage of said target; and

capacitively coupling power into said chamber at least partially by applying DC power to said target but not including inductively coupling power into said chamber to thereby excite said working gas into a plasma to sputter said metal from said target onto said working substrate, an amount of said DC power being no more than 18 kW normalized to a circular reference substrate of 200mm diameter, thereby achieving an ionization density of said metal of at least 20% wherein an total magnetic flux produced by said outer pole is at least 1.5 times an integrated magnetic flux produced by said inner pole (claim 7).

17. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11

F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

18. Claim 6 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 7 of U.S. Patent No. Fu-825. Although the conflicting claims are not identical, they are not patentably distinct from each other.

Instant claim 6 recites a method of sputtering a material from a target comprising a metal onto a working substrate supported on a pedestal in a system including a magnetron disposed on a side of said target opposite said pedestal and including an outer pole of one magnetic polarity and surrounding an inner pole of another magnetic polarity, wherein said outer pole extends from said center of said target to a peripheral portion of said target and has an area smaller than a similarly extending circle, said method comprising:

rotating said magnetron about a center of said target to achieve full sputtering coverage of said target; and

capacitively coupling power into said chamber at least partially by applying DC power to said target but not including inductively coupling power into said chamber to thereby excite said working gas into a plasma to sputter said metal from said target onto

said working substrate, an amount of said DC power being no more than 18 kW normalized to a circular reference substrate of 200mm diameter, thereby achieving an ionization density of said metal of at least 20%.

Fu-825 recites in claim 7:

Instant claim 10 recites a method of sputtering a material from a target comprising a metal onto a substantially circular working substrate supported on a pedestal in a system including a magnetron disposed on a side of said target opposite said pedestal and including an outer pole of one magnetic polarity and surrounding an inner pole of another magnetic polarity, wherein said outer pole extends from said center of said target to a peripheral portion of said target and has an area smaller than a similarly extending circle, said method comprising:

Rotating said magnetron about a center of said target to achieve full sputtering coverage of said target; and

Capacitively coupling power into said chamber at least partially by applying DC power to said target but not including inductively coupling power into said chamber to thereby excite said working gas into a plasma to sputter said metal from said target onto said working substrate, an amount of said DC power being no more than 18 kW normalized to a circular reference substrate of 200mm diameter, thereby achieving an ionization density of said metal of at least 20% wherein an total magnetic flux produced by said outer pole is at least 1.5 times an integrated magnetic flux produced by said inner pole (claim 7).

Instant claim 6, is broader than the claim of Fu-825 and therefore is held as an obvious variant of Fu-825 not statutory.

19. Claims 7-9 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 7 of U.S. Patent No. Fu-825 in view of U.S. patent No. 5,650,652 (Edelstein).

The teachings of instant claim 6 and Fu-825 claim 7 have been discussed in the preceding paragraph and are incorporated herein.

The differences between the instant claims and claims 7-9 of Fu-825 are that Fu-825 does not lay claim to particular metals comprising aluminum (claim 7), copper (claim 8) or titanium (claim 9).

Use of aluminum, copper and titanium metals or their alloys are well known in the art of sputtering, particularly in the fabrication processes of semiconductor devices (Edelstein, col. 4, ll. 58-63).

Selection of the target material is a matter of preference dependent upon the particular manufacturing process employed by one of ordinary skill in the art.

For example it is well known to sputter copper and/or aluminum in the formation of wire patterns on a substrate when forming semiconductor devices. As well it is well known to sputter titanium comprising targets when forming barrier layers in semiconductor devices.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Fu-825 by selecting the particular metals to be either copper, aluminum or titanium since it has been held that

selection of materials is a matter of preference dependent upon the particular manufacturing process. *In re Leshin*, 125 USPQ 416.

20. Claims 6 and 7 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 11 and 12 of copending Application No. 09/918,135 (Fu-135). Although the conflicting claims are not identical, they are not patentably distinct from each other.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Instant claim 6 recites a method of sputtering a material from a target comprising a metal onto a working substrate supported on a pedestal in a system including a magnetron disposed on a side of said target opposite said pedestal and including an outer pole of one magnetic polarity and surrounding an inner pole of another magnetic polarity, wherein said outer pole extends from said center of said target to a peripheral portion of said target and has an area smaller than a similarly extending circle, said method comprising:

Rotating said magnetron about a center of said target to achieve full sputtering coverage of said target; and

Capacitively coupling power into said chamber at least partially by applying DC power to said target but not including inductively coupling power into said chamber to thereby excite said working gas into a plasma to sputter said metal from said target onto said working substrate, an amount of said DC power being no more than 18 kW

normalized to a circular reference substrate of 200mm diameter, thereby achieving an ionization density of said metal of at least 20%.

Instant claim 7 recites that the metal comprises aluminum.

Fu-135 recites in claim 11:

A method of sputtering a material from a target comprising a metal onto a working substrate supported on a pedestal in a system including a magnetron disposed on a side of said target opposite said pedestal and including an outer pole of one magnetic polarity and surrounding an inner pole of another magnetic polarity, wherein said outer pole extends from said center of said target to a peripheral portion of said target and has an area smaller than a similarly extending circle, said method comprising:

rotating said magnetron about a center of said target to achieve full sputtering coverage of said target; and

capacitively coupling power into said chamber at least partially by applying DC power to said target but not including inductively coupling power into said chamber to thereby excite said working gas into a plasma to sputter said metal from said target onto said working substrate, an amount of said DC power being no more than 18 kW normalized to a circular reference substrate of 200mm diameter, thereby achieving bottom coverage of at least 25% in a hole having an aspect ratio of at least 5 (claim 11). The metal comprises aluminum (claim 12).

The difference between the instant claims and Fu-135 is that Fu-135 does not recite achieving an ionization density of said metal of at least 20% (claim 6).

Given that Fu-135 employs similar claimed process conditions for the same claimed magnetron configuration as instant claim 6, it is expected that at the power levels selected (no more than 18 kW and without inductive coupling) in the magnetron array of claim 11 of Fu-135 will inherently achieve an ionization density of said metal of at least 20.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is (703) 305-0635. The examiner can normally be reached on Monday through Thursday from 8:00 a.m. to 5:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on (703) 308-3322.

FAX communications should be sent to the appropriate FAX number: (703) 872-9311 for After Final Responses only; (703) 872-9310 for all other responses. FAXES received after 4 p.m. will not be processed until the following business day.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

gc

RODNEY G. MCDONALD
PRIMARY EXAMINER

February 27, 2002